

Appl. No. 10/676,585
Amdt. Dated January 10, 2006
Reply to Final Office action of October 12, 2005

REMARKS/ARGUMENTS

Claims 11-28 are pending in the present application.

This Amendment is to support a Request for Continued Examination (RCE) filed concurrently. In the Final Office Action dated October 12, 2005, the Examiner rejected claims 11, 12, 15-21, 25, and 26 under 35 U.S.C. §102(e); and claims 13-14, 22-24 under 35 U.S.C. §103(a). Applicants have amended claim 11 to clarify the claim language. Reconsideration in light of the amendments and remarks made herein is respectfully requested.

Election/ Restriction

In the Final Office Action, the Examiner states that the newly submitted claims 27-28 are directed to an invention that is independent or distinct from the invention originally claimed. The Examiner then states that claims 27-28 have been withdrawn from consideration as being directed to non-elected invention.

Applicants respectfully request the Examiner reconsider the election/restriction.

Inventions as claimed are independent if there is no disclosed relationship between the inventions, that is, they are unconnected in design, operation, and effect. MPEP 806.06. Two or more inventions are related (i.e., not independent) if they are disclosed as connected in at least one of design (e.g., structure or method of manufacture), operation (e.g., function or method of use), or effect. Related inventions are distinct if the inventions *as claimed* are not connected in at least one of design, operation, or effect (e.g., can be made by, or used in, a materially different process) and wherein at least one invention is **PATENTABLE** (novel and nonobvious) **OVER THE OTHER** (though they may each be unpatentable over the prior art). MPEP 802.01. Where inventions are related as disclosed but are not distinct as claimed, restriction is never proper. MPEP 806(c).

Applicants contend that claims 27-28 are neither independent nor distinct from claim 11. The claimed invention is about a thermoelectric film fabricated on a bare wafer and located at a location matched to an area that needs thermal control. Accordingly, the ability to control the heat extraction is clearly related to the location matched to an area that needs thermal control. Claims 27 and 28 add an additional feature of the thermoelectric film in that it is selectively turned on or off by a power controller. This additional feature is clearly connected to the thermal

Appl. No. 10/676,585
Amdt. Dated January 10, 2006
Reply to Final Office action of October 12, 2005

control aspect of the elected invention. Since claims 27-28 are related and are not distinct to the elected invention, the restriction is improper. MPEP 806 (C).

Response to the Examiner's arguments

In the Final Office Action, the Examiner contends that "matched to an area on the active wafer that needs thermal control" as claimed is broad enough to include any active area that is contacted by the thermoelectric film 28 (Final Office Action, page 6). The Examiner further states that in Fig. 8C, the thermoelectric film 28 is located right under the location of the active circuitry layer 62 with active devices formed therein that need thermal control. Applicants respectfully disagree.

First, claims should be interpreted consistently with the specification, which provides content for the proper construction of the claims because it explains the nature of the patentee's invention. See Renishaw P.L.C. v. Marposs Societa Per Azioni, 158 F.3d 1243 (Fed. Cir. 1998). During patent examination, the pending claims must be "given the broadest reasonable interpretation consistent with the specification". See MPEP 2111. Here, the phrase "a location matched to an area on the active wafer that needs thermal control" implies a localized area, not the entire area. In contrast, Macris discloses a structure 56 that covers the entire area of the IC chip structure 58. As shown in Figure 8C, the face 28a of the semiconductor 28 is wafer bonded to the IC chip substrate (Macris, paragraph [0113]), not at localized locations.

Second, the structure 56 is not a thermoelectric film as claimed. The thermoelement couple is created through the bonding between a conductor or semiconductor 28 to at least one dissimilar conductor or semiconductor 35 (Macris, paragraph [0113]). It covers the entire area of the IC chip structure 58. Therefore, the Macris thermoelement couple is not an individual thermoelectric film fabricated on a bare wafer.

The Examiner further states that Macris suggests the use of material for forming thermal element but not limited to silicon, carbon, silicon carbide, gallium arsenide or electrically conductive polymers (Final Office Action, page 6). Applicants respectfully disagree. The materials mentioned in Macris refer to the materials for the semiconductor used in the forming of the heat sink/spreader structure 56, not the individual thermoelectric films fabricated on a bare wafer or a substrate. Furthermore, Macris does not suggest using an alloy.

Appl. No. 10/676,585
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Rejection Under 35 U.S.C. § 102

In the Final Office Action, the Examiner rejected claims 11, 12, 15-21, 25, and 26 under 35 U.S.C. §102(e) as being anticipated by U.S. Publication No. 2002/0063330 issued to Macris ("Macris"). Applicants respectfully traverse the rejection and contend that the Examiner has not met the burden of establishing a prima facie case of anticipation.

Macris discloses a heat sink/heat spreader structures and methods of manufacture. A thermoelement couple comprises at least one heat absorbing junction 30 and two heat rejecting junctions 32 (Macris, paragraph [0113]). The heat absorbing junction is positioned near the center of the thermoelement face 28a and the heat rejecting junction 32 is positioned near the perimeter of the thermoelement face 28a (Macris, paragraph [0082]).

Macris does not disclose at least, either expressly or inherently, (1) the thermoelectric film being located at a location matched to an area that needs thermal control, as recited in independent claims 11 and 21, and (2) the thermoelectric film being selectively turned on or off by a power controller as recited in new dependent claims 27 and 28.

First, Macris discloses the entire heat sink/ spreader structure 56 acting as a thermoelement couple, not an individual thermoelectric film fabricated on a bare wafer or a substrate. The thermoelement couple is created through the bonding between a conductor or semiconductor 28 to at least one dissimilar conductor or semiconductor 35 (Macris, paragraph [0113]). Therefore, the thermoelement couple is not a thermoelectric film fabricated on a bare wafer.

Second, Macris merely discloses the heat absorbing is positioned near the center of the thermoelement face 28a and the heat rejecting junction 32 is positioned near the perimeter of the thermoelement face 28a (Macris, paragraph [0082]). Since these locations are fixed with respect to the thermoelement material 28, they are not matched to areas that need thermal control as recited in amended claims 11 and 21.

To anticipate a claim, the reference must teach every element of a the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Vergegal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the...claim." Richardson v. Suzuki Motor

Appl. No. 10/676,585
Amdt. Dated January 10, 2006
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Co., 868 F.2d 1226, 1236, 9 USPQ 2d 1913, 1920 (Fed. Cir. 1989). Since the Examiner failed to show that Macris teaches or discloses any one of the above elements, the rejection under 35 U.S.C. §102 is improper.

Therefore, Applicants believe that independent claims 11 and 21 and their respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicants respectfully request the rejection under 35 U.S.C. §102(c) be withdrawn.

Rejection Under 35 U.S.C. § 103

2. In the Final Office Action, the Examiner rejected claims 13-14, 22-24 under 35 U.S.C. §103(a) as being unpatentable over Macris in view of U.S. Patent No. 6,614,109 issued to Cordes et al. ("Cordes"). Applicants respectfully traverse the rejection and contend that the Examiner has not met the burden of establishing a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *MPEP* §2143, p. 2100-129 (8th Ed., Rev. 2, May 2004). Applicants respectfully contend that there is no suggestion or motivation to combine their teachings, and thus no *prima facie* case of obviousness has been established.

Macris discloses a heat sink/heat spreader structures and methods of manufacture as discussed above.

Cordes discloses a method and apparatus for thermal management of integrated circuits. Two p-type thermoelectric elements are made from a composition of $\text{Bi}_{0.5}\text{Sb}_{1.5}\text{Te}_{0.3}$ formed by a pulsed electrochemical deposition process wherein alternating layers of BiTe and SbTe of predetermined compositions form the desired composition of $\text{Bi}_{0.5}\text{Sb}_{1.5}\text{Te}_{0.3}$ (Cordes, col. 6, lines 5-11).

Macris and Cordes, taken alone or in any combination, do not disclose, suggest, or render obvious (1) the thermoelectric film being located at a location matched to an area that needs thermal control, as recited in independent claims 11 and 21, (2) the thermoelectric film being

Appl. No. 10/676,585

Amdt. Dated January 10, 2006

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selectively turned on or off by a power controller as recited in new dependent claims 27 and 28, and (3) the thermoelectric film being made by an alloy being one of Bi_2Te_3 , Sb_2Te_3 , and Zn_4Sb_3 , as recited in claim 14 and 24. There is no motivation to combine Macris and Cordes because neither of them addresses the problem of integrating thermoelectric elements into wafer at locations that needs heat extraction. There is no teaching or suggestion that such as location of thermal control is present. Macris, read as a whole, does not suggest the desirability of using one of Bi_2Te_3 , Sb_2Te_3 , and Zn_4Sb_3 alloys.

Macris does not disclose or suggest individual thermoelectric elements. Furthermore, Macris does not disclose or suggest the individual thermoelectric elements being located at locations matched to areas that need thermal control. Furthermore, Macris merely discloses using one of silicon, carbon, silicon carbide, gallium arsenide, or electrically conductive polymers as the semiconductor material in the structure 56 (Macris, paragraph [0079]), not an alloy for the individual thermoelectric films comprising one of Bi and Te, Sb and Te, Te, Si, Ge and Sb, and Pb and Te, or Bi_2Te_3 , Sb_2Te_3 , and Zn_4Sb_3 . Cordes merely discloses a composition of $\text{Bi}_{0.5}\text{Sb}_{1.5}\text{Te}_{0.3}$, not Bi_2Te_3 , Sb_2Te_3 , and Zn_4Sb_3 . Furthermore, Cordes discloses using a pulsed electrochemical deposition process to form the thermoelectric elements, not using bonding two wafers.

When applying 35 U.S.C. 103, the following tenets of patent law must be adhered to: (A) The claimed invention must be considered as a whole; (B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and (D) Reasonable expectation of success is the standard with which obviousness is determined. Hodosh v. Block Drug Co., Inc., 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986). "When determining the patentability of a claimed invention which combined two known elements, 'the question is whether there is something in the prior art as a whole suggest the desirability, and thus the obviousness, of making the combination.'" In re Beattie, Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., 730 F.2d 1452, 1462, 221 USPQ (BNA) 481, 488 (Fed. Cir. 1984). To defeat patentability based on obviousness, the suggestion to make the new product having the claimed characteristics must come from the prior art, not from the hindsight knowledge of the invention. Interconnect

Appl. No. 10/676,585
Amdt. Dated January 10, 2006
Reply to Final Office action of October 12, 2005

Planning Corp. v. Feil, 744 F.2d 1132, 1143, 227 USPQ (BNA) 543, 551 (Fed. Cir. 1985). To prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the Examiner to show a motivation to combine the references that create the case of obviousness. In other words, the Examiner must show reasons that a skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the prior elements from the cited prior references for combination in the manner claimed. In re Rouffet, 149 F.3d 1350 (Fed. Cir. 1996), 47 USPQ 2d (BNA) 1453. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or implicitly suggest the claimed invention or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973. (Bd.Pat.App.&Inter. 1985). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Furthermore, although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." In re Mills 916 F.2d at 682, 16 USPQ2d at 1432; In re Fitch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992).

In the present invention, the cited references do not expressly or implicitly suggest the above elements. In addition, the Examiner failed to present a convincing line of reasoning as to why a combination of Macris and Cordes is an obvious application of integrating thermoelectric elements at localized areas using an alloy.

Therefore, Applicants believe that independent claims 11 and 21 and their respective dependent claims are distinguishable over the cited prior art references. Accordingly, Applicants respectfully request the rejections under 35 U.S.C. §102(e), and 35 U.S.C. §103(a) be withdrawn.

Appl. No. 10/676,585
Amdt. Dated January 10, 2006
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Conclusion

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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